Listing of Claims:

1. (Currently Amended) A method of operating a thermal processing system comprising:

positioning a wafer for processing by the thermal processing system on a hotplate comprising a plurality of zones;

receiving feed forward data;

estimating wafer stresses using the feed forward data;

creating a thermal model for a gap between the wafer and the hotplate, wherein a thermal response for the gap is predicted based on the estimated wafer stresses;

creating a dynamic thermal model of the thermal processing system that incorporates the thermal model for the gap;

establishing a plurality of intelligent setpoints using the dynamic thermal model of the thermal processing system, wherein each of the plurality of intelligent setpoints is associated with a corresponding one of the plurality of zones; and

reducing critical dimension (CD) variation across the wafer, profile variation across the wafer, or uniformity variation across the wafer, or a combination of two or more thereof by controlling an actual temperature of each of the plurality of zones of the hotplate using a corresponding one of the plurality of intelligent setpoints during processing.

2. (Cancelled)

3. (Currently Amended) The method of claim [[2]] 1 wherein wafer stresses are estimated using refractive index (n) data, or extinction coefficient (k) data, or a combination thereof extracted from the feed forward data.

4. (Currently Amended) The method of claim [[2]] 1 wherein the feed forward data comprises layer information including the number of layers, layer position, layer composition, layer uniformity, layer density, or layer thickness, or a combination of two or more thereof.

5. (Currently Amended) The method of claim [[2]] 1 wherein the feed forward data includes critical dimension (CD) data for the wafer, profile data for the wafer, or uniformity data for the wafer, or a combination of two or more thereof.

6. (Currently Amended) The method of claim [[2]] 1 wherein the feed forward data includes critical dimension (CD) data for a plurality of locations on the wafer, profile data for a plurality of locations on the wafer, or uniformity data for a plurality of locations on the wafer, or a combination of two or more thereof.

7. (Currently Amended) The method of claim [[2]] 1 wherein the feed forward data includes a plurality of locations radially positioned on the wafer.

8. (Currently Amended) The method of claim [[2]] 1 wherein the feed forward data includes a plurality of locations non-radially positioned on the wafer.

9. (Currently Amended) ~~The method of claim 1 further comprising:~~ A method of operating a thermal processing system comprising:

positioning a wafer for processing by the thermal processing system on a hotplate comprising a plurality of zones;

examining a real-time response of the wafer and the hotplate;

estimating wafer stresses using the real-time response; [[and]]

creating a thermal model for a gap between the wafer and the hotplate, wherein a thermal response for the gap is predicted based on the estimated wafer stresses; [[and]]

creating a dynamic thermal model of the thermal processing system ~~incorporating~~ that incorporates the thermal model for the gap ~~into the dynamic thermal model of the system~~;

establishing a plurality of intelligent setpoints using the dynamic thermal model of the thermal processing system, wherein each of the plurality of intelligent setpoints is associated with a corresponding one of the plurality of zones; and

reducing critical dimension (CD) variation across the wafer, profile variation across the wafer, or uniformity variation across the wafer, or a combination of two or more thereof by controlling an actual temperature of each of the plurality of zones of the hotplate using a corresponding one of the plurality of intelligent setpoints during processing.

10. (Cancelled)

11. (Currently Amended) The method of claim [[1]] 9 further comprising:

modeling a thermal interaction between the zones of the hotplate; and

incorporating the model of the thermal interaction into the dynamic thermal model of the system.

12. (Currently Amended) The method of claim [[1]] 9 further comprising:

creating a virtual sensor for estimating a temperature for the wafer; and

incorporating the virtual sensor into the dynamic thermal model of the system.

13. (Currently Amended) The method of claim [[1]] 9 further comprising:

modeling a thermal interaction between the hotplate and an ambient environment; and

incorporating the model for the thermal interaction into the dynamic thermal model of the system.

14. (Currently Amended) The method of claim [[1]] 9 further comprising:

creating a diffusion-amplification model of a resist carried by the wafer; and

incorporating the diffusion-amplification model into the dynamic thermal model of the system.

15. (Currently Amended) ~~The method of claim 1 further comprising:~~ A method of operating a thermal processing system comprising:

positioning a wafer for processing by the thermal processing system on a hotplate comprising a plurality of zones;

creating a dynamic thermal model of the thermal processing system;

creating a variation vector D, wherein the variation vector comprises differences between measurement data and a desired value;

establishing a plurality of intelligent setpoints using the dynamic thermal model of the thermal processing system, wherein each of the plurality of intelligent setpoints is associated with a corresponding one of the plurality of zones;

parameterizing at least one nominal setpoint into a vector R comprising at least one of the plurality of intelligent ~~setpoint~~ setpoints;

creating a sensitivity matrix using the dynamic thermal model; [[and]]

determining the at least one intelligent setpoint by solving an optimization problem comprising

$$\min_{r} \left\| D - \alpha \cdot MR \right\|,$$

wherein $r_{min} < r < r_{max}$, R is the vector comprising the at least one intelligent setpoint, M is the sensitivity matrix, α is a proportionality constant relating the measurement data to the sensitivity matrix M , and D is the variation vector; and

reducing critical dimension (CD) variation across the wafer, profile variation across the wafer, or uniformity variation across the wafer, or a combination of two or more thereof by controlling an actual temperature of each of the plurality of zones of the hotplate using a corresponding one of the plurality of intelligent setpoints during processing.

16. (Original) The method of claim 15 further comprising:

updating a recipe with the plurality of intelligent setpoint;

running the updated recipe;

obtaining updated measurement data; and

iterating until a desired uniformity is achieved.

17. (Original) The method of claim 16 wherein the desired uniformity comprises a 3-sigma variation of less than approximately two percent.

18. (Original) The method of claim 17 wherein the desired uniformity comprises a 3-sigma variation of less than approximately one percent.

19. (Previously Presented) The method of claim 15 further comprising:

receiving feed forward data;

obtaining the measurement data from the feed forward data, wherein the measurement data comprises critical dimension measurements, profile measurements, or uniformity measurements, or a combination of two or more thereof; and

determining the desired value, wherein the desired value comprises a desired critical dimension, a desired profile, or a desired uniformity, or a combination of two or more thereof.

20. (Previously Presented) The method of claim 15 further comprising:

executing a process using a recipe having at least one nominal setpoint for each zone of the hotplate;

obtaining the measurement data from the executed process wherein the measurement data comprises critical dimension measurements, profile measurements, or uniformity measurements, or a combination of two or more thereof; and

determining the desired value, wherein the desired value comprises a desired critical dimension, a desired profile, or a desired uniformity, or a combination of two or more thereof.

21. (Original) The method of claim 15 further comprising:

making temperature perturbations for each zone of the hotplate; and

establishing the sensitivity matrix M using results of the temperature perturbations.

22. (Original) The method of claim 15, further comprising:

using an instrumented wafer to establish the sensitivity matrix M.

23. (Currently Amended) The method of claim 15 further comprising:

determining a vector D of a thermal dose at each radial element location, wherein

$$D = \begin{bmatrix} d_1 \\ \vdots \\ d_n \end{bmatrix};$$ ~~and~~

characterizing perturbations in the thermal dose as

$$\begin{bmatrix} d_1 \\ \vdots \\ d_n \end{bmatrix} = M \begin{bmatrix} r_1 \\ \vdots \\ r_m \end{bmatrix};$$ and

determining values of the vector r, such that the vector d removes across wafer variations in the vector D.

24. (New) A method of operating a thermal processing system comprising:

positioning a wafer for processing by the thermal processing system on a hotplate comprising a plurality of zones;

estimating wafer warpage;

creating a thermal model for a gap between the wafer and the hotplate, wherein a thermal response for the gap is predicted based on the estimated wafer warpage;

creating a dynamic thermal model of the thermal processing that incorporates the thermal model for the gap;

establishing a plurality of intelligent setpoints using the dynamic thermal model of the thermal processing system, wherein each of the plurality of intelligent setpoints is associated with a corresponding one of the plurality of zones; and

reducing critical dimension (CD) variation across the wafer, profile variation across the wafer, or uniformity variation across the wafer, or a combination of two or more thereof by controlling an actual temperature of each of the plurality of zones of the hotplate using a corresponding one of the plurality of intelligent setpoints during processing.

25. (New) The method of claim 24 further comprising:

modeling a thermal interaction between the zones of the hotplate; and

incorporating the model of the thermal interaction into the dynamic thermal model of the system.

26. (New) The method of claim 24 further comprising:

creating a virtual sensor for estimating a temperature for the wafer; and

incorporating the virtual sensor into the dynamic thermal model of the system.

27. (New) The method of claim 24 further comprising:

modeling a thermal interaction between the hotplate and an ambient environment; and

incorporating the model for the thermal interaction into the dynamic thermal model of the system.

28. (New) The method of claim 24 further comprising:

creating a diffusion-amplification model of a resist carried by the wafer; and

incorporating the diffusion-amplification model into the dynamic thermal model of the system.